TRIUMF Advanced Rare Isotope Laboratory (ARIEL)

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Pairing studies with transfer reactions at ARIEL*

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A wealth of experimental data supports the important role played by pairing correlations in atomic nuclei. In analogy to superconductors, nuclear "Cooper pairs"have a strong influence on many properties such as binding energies, excitation spectra, deformations, moments of inertia, etc.
The study of pairing correlations in exotic nuclei is a subject of active research in nuclear structure. Specific areas include: i) The role of isovector pairing in neutron-rich isotopes, where the effects of weak binding and continuum coupling are expected to be important, ii) The competition of isovector and isoscalar neutron-proton pairing in N=Z nuclei, and iii) The delicate balance between single-particle degrees of freedom and pairing and quadrupole correlations in the Islands of Inversion.
It is well established that direct single- and two-nucleon direct transfer reactions are unique tools to understand pairing correlations in nuclei as they are particularly suited to probe the quasi-particle nature and the two-nucleon pair density by determining occupancies (spectroscopic factors) and two-nucleon amplitudes (TNA) respectively.
The ARIEL facility will provide access to enhanced rare-isotope-beams capabilities at TRIUMF, with energies up to 16.5 MeV/u. These beams and existing (and to be developed) state-of-the art instrumentation will enable a vibrant research program to study pairing correlations in exotic nuclei with transfer reactions.
In this presentation we will discuss some examples addressing the three areas mentioned above to showcase the opportunities that ARIEL will offer on this topic.

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Primary author: MACCHIAVELLI, Augusto (Oak Ridge National Laboratory)

Presenter: MACCHIAVELLI, Augusto (Oak Ridge National Laboratory)

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